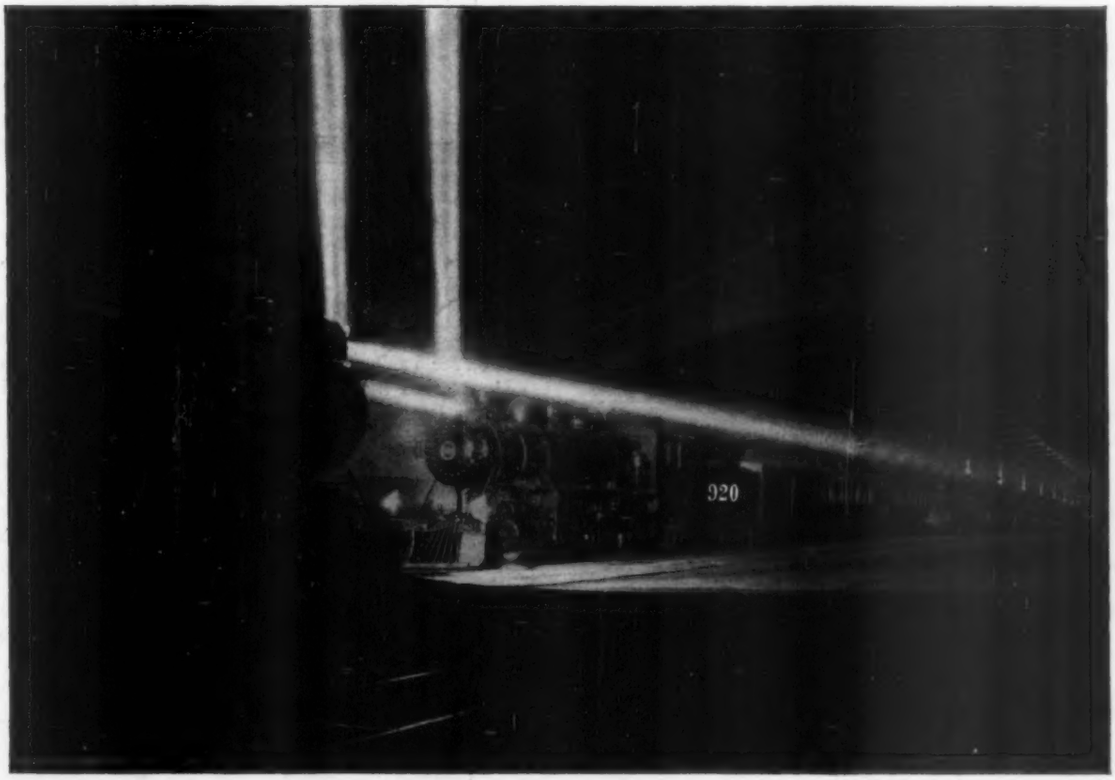
POPULAR MECHANICS

An Illustrated Weekly Review of the Mechanical Press of the World

TELLS YOU HOW TO DO THINGS. WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 1, No. 17. CHICAGO, MAY 3, 1902. PRICE 5 CENTS.

ELECTRIC HEADLIGHT RENDS THE SKY



Latest Electric Device to Prevent Collisions, Used on Fast Passenger Trains of the C. M. & St. P. Ry.

From a midnight photograph taken by this wonderful signal light.

IN THIS ISSUE:

Camels Draw American Machines.
Woman Built New York's First Sidewalk.
Driving Machinery by Electric Motors.
Convention by Long Distance Telephone.
Cork and Where It Comes From.
Electricity for Boys—Building a Motor.
Cleaning Small Terra Cotta Sewer Pipes.
Storage Battery for Auto Gas Engines.
Boats for Prospectors.
Birds of Mystery Come Again.
"Eels" in Wheat Flour.
Sure Trick to Catch Bass.
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Largest Chain in the World.
Germ Proof Armor for Physicians.
"For the Madam."
Squirrels Injure Telephone Lines.
How Excelsior is Made.
Locomotives of a Century—Part IV.
Fifty-nine Articles—35 Illustrations.

LIBRARY OF CONGRESS MAY 2 1902 SMITHSONIAN DEPOSIT.

FOR SALE BY ALL NEWSDEALERS.

HEADLIGHT THAT PENETRATES THE SKY.

The new electric headlight which throws shafts of light vertically and horizontally as mentioned in a previous issue of Popular Mechanics, is being installed on passenger trains of the Chicago, Milwaukee & St. Paul railroad. The light marks a new era in railroading as a safeguard against wrecks. The vertical light penetrating the sky may be seen above hill tops and trees for miles about and thus give warning to a train approaching from any direction.

YOUNG WIFE IS A BLACKSMITH.

Wealthy Boston Girl Has a Professional Rival in Mrs. Faber of California.

Miss Lydia Weld of Boston, who was thought to be the only woman blacksmith in America, has a rival at the other end of the continent in Mrs. Sarine Ann Faber, of Santa Rose, Cal., the young wife of Mr. C. F. Faber. Miss Weld, as told in Popular Mechanics, March 15, is a student of the Massachusetts Institute of Technology. She is of wealthy parents and engages in the vocation through choice. Mrs. Faber assists her husband at the forge also "for pure love of the work," as Mr. Faber is well to do and at the head of a prosperous establishment. The couple are newly married and she prefers being in his company in the blacksmith shop to the drudgery of the household. She has acquired wonderful skill in her three years of training and now can make welds, shoe a horse, and set a tire as neatly as her husband. Both Miss Weld and Mrs. Faber show the splendid results of their muscular training. Both are of athletic form, with muscles like men, agile step and faces glowing with youthful health that are the envy of all their feminine associates.

SAYS HEAT HINDERS RELIGION.

Everything in America is overheated except the street cars, according to the assertions of a London minister in discussing "Pulpit Handicaps in America." Heat, he declares is a foe to devotion, and says that the churches in America are so heated that one is steeped in a warm languor, which is completely subversive of extreme devotional feeling.

The Americans differ with the Englishman, and claim that warm churches are conducive to warm devotion. They quote Mr. Spurgeon, who declared that no one was ever converted when his feet were cold. This they say is the reason there is so little religion among the English, whose king patronizes the races, brews beer and attends Sunday concerts and wine gardens. It is charged that most of the churches in England are so cold that a person has to shiver throughout a sermon and it is impossible to get heated up to a truly religious pitch.

NEED OF VENTILATION.

It is not the actual overheating of rooms, but their lack of ventilation that makes colorless faces. In well-regulated houses the maid opens the windows of the sitting and dining rooms every morning before breakfast for five or ten minutes, even on the coldest winter days. But by noon the furnace heat has exhausted all the oxygen in the house, and this devitalized air is taken into the lungs of the occupants for the rest of the day. With a good furnace a house should be aired three times a day. Visitors entering a house in winter time are sure to find the atmosphere oppressive, but after fifteen or twenty minutes they forget about it and are content to remain in it for an indefinite time. English girls are noted the world over for the fresh coloring of their complexions; they never live in furnace-heated houses, whose doors and windows are kept carefully closed. The open fires are sufficient for heat and ventilation.

CAMELS DRAW AMERICAN MACHINES.

Methods of Farming in Siberia, to Which Land Great Shipments Yankee Implements Are Being Made.

A Russian team hitched to an American machine is a queer combination that even makes the Russians smile. Such an admixture is illustrated in the accompanying cuts showing the latest improved American farm implements being drawn by camels in Siberia. Russians with the praiseworthy spirit of progress they

Mower Drawn by Siberian Camels.

are now manifesting, are perfectly willing that their territory be invaded by American mechanism, but they refuse to acknowledge the superiority of the horse over their beloved camel.

"Hitch an Asiatic camel to an up-to-date farm implement," said one Russian, "and you have a modus operandi that is just one on the Yankee." The camel, the Russian claims, has superior endurance to the horse, he can cover more ground in a day, requires less careful attention, is hardier and can pull a greater load. Some of them declare that the camel would be as great an addition to the farming industry of America as is the American farm implement to Russian agriculture. The American farmer, however, is inclined to consider the Russian over zealous in his appreciation of the camel, and is content to stick to the horse.

Heavy shipments of American farm implements into Siberia by the firm of D. M. Osborne & Co., Auburn, N. Y., are working a revolution in the old Russian methods. Everywhere may be seen plows, reapers, mowers, rakes and every other kind of device for tilling the soil, all of American manufacture. The shipments

Rake Drawn by Camels in Siberia.

are yet being made and the demand is increasing. Siberia, once the home of the Russian exile, is as a result blossoming forth

with verdant fields, adding wondrously to the world's commerce and to the power of Russia. To American farm implements and the Trans-Siberian railroad equal credit is due in the development of Siberia.

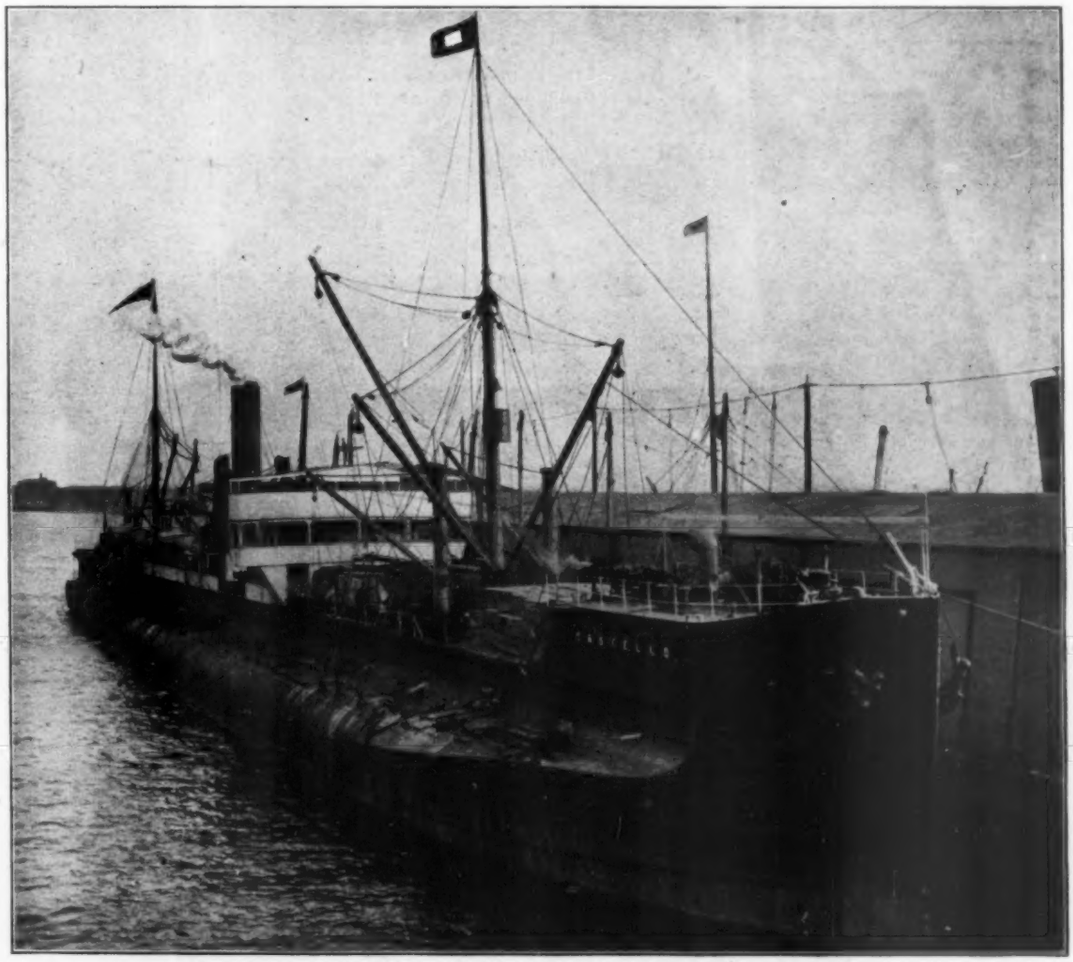
WONDERFUL MECHANICAL DRAGON.

A most remarkable stage dragon, which to the audience has every appearance of a living monster, spitting fire, flashing its eyes, wagging its tail and gnarling as it drags its ponderous form along, has been constructed in Paris for the production of "Siegfried," by Jean de Reszke.

The body is built of a series of circles, the diameter of the trunk being such that two men can easily find room in the interior. The head is mounted on sliding rails and the tail, which is independent and can be moved at the proper moment, has similar ingenious machinery for showing the writhing of the monster. The total length of the body is 41 feet. In the Wagnerian musical drama the dragon is slain by "Siegfried," who is impersonated by Jean de Reszke.

WOMAN BUILT NEW YORK'S FIRST SIDEWALK.

The first stone sidewalk in New York was laid by a woman, Mrs. Samuel Provoost, more generally known by her maiden name, Polly Spratt, in the early part of the last century. Polly Spratt's husband died young, says William Rittenhouse in Forward, leaving a fortune and large importing business. Polly Spratt was an exceedingly wise business woman all her life, as well as a celebrated belle. She undertook the management of all her husband's affairs. Across the street from her handsome home she built a row of business houses. It was a little out of the line of traffic, and she decided to attract special attention to it. She therefore sent for a number of large, flat flagstones and laid a fine sidewalk, not only in front of her property, but up to the street on either side. Polly Spratt's pavement was the talk of the town, and her store was always thronged. Ladies came from Philadelphia to shop at this wonderful New York store. Mrs. Provoost made such a fortune that she kept a two-horse coach, a thing which no one but the governor had ever been known to do. Her success caused others to follow her example.



Steamer "Castello" Loaded with Farm Implements Destined for Black Sea Ports.

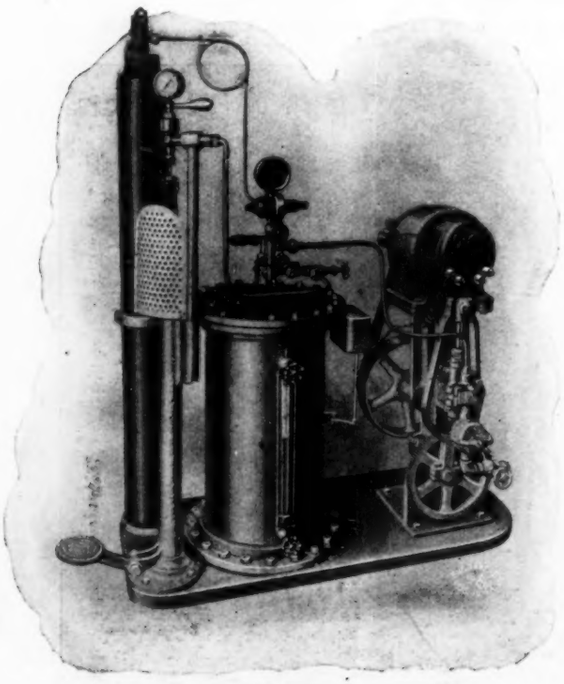
KANGAROO TAIL FOR SOUP BEATS OXTAIL.

The Australian meat trade in England has received a further extension by the arrival at Smithfield of large supplies of kangaroos' tails. These strange imports are intended for the purpose of providing Britishers with a new table delicacy in the way of kangaroo-tail soup. This has long been a highly popular soup at the antipodes, while on its recent introduction to Paris it also met with much acceptance by the patrons of the leading hotels and restaurants, supplanting not only oxtail, but even the more prized turtle at many establishments. The dealers have received large orders for the supply of kangaroo tails to some of the principal west end and city restaurants in London.

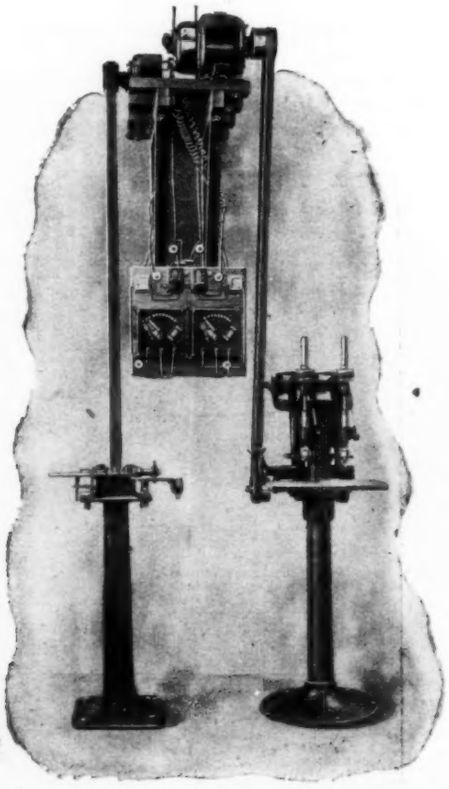
Capt. Morse, chief signal officer of the Department of California, has opened negotiations for the installation of a system of wireless telegraphy between army stations in Alaska.

DRIVING MACHINERY BY ELECTRIC MOTORS.

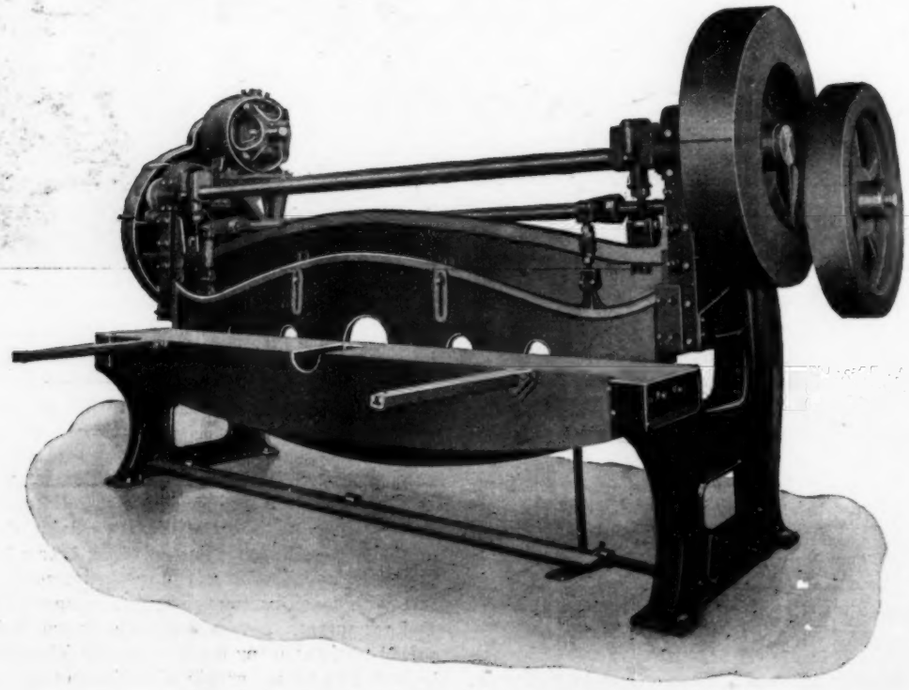
The amount of power required to turn the shafting and pulleys and drive the belts in a large manufacturing plant is very much greater than most people would think. This power really produces nothing—does no actual work; it is simply the expensive method of transmitting power from the steam engine to the machine where work is done. In a small plant the loss is not of so much consequence, but in a large concern tons of coal are burned every year with nothing to show in return. Recent practice is all in favor of having an electric motor attached to each machine to drive it. The engine drives an electric generator; the power is carried through wires, which need not show or take up any valuable space, with comparatively little loss in



Carbonator Operated by ¼ H. P. Motor.

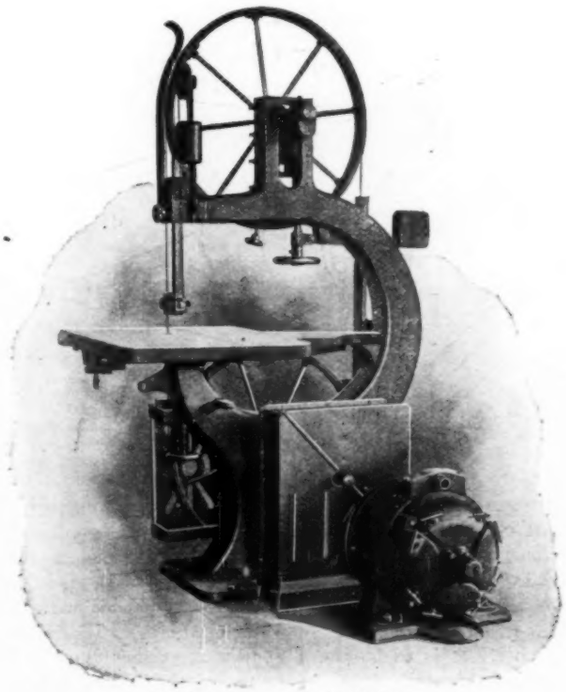


Emery Grinder and Two-Spindle Drill Press with ½ H. P. Motors.



5 H. P. Motor Direct Connected to 10 ft. Sheet Iron Shear.

transmission to the machine. When the machine is idle no power is wasted. Then there is the great saving in wear on belts, and the first cost of steel shafting, hangers and belts is all saved. Five hundred feet of shafting, with necessary hangers, costs considerable; 500 feet of wire but a few dollars—and it



Band Saw Driven by Motor.

lasts a lifetime. A small shop need no longer go to the expense of engine and boiler but may either put in a large motor to drive its shafting, or better, put a motor on each machine. The number and variety of these small machine motors is great. Motors are built for every class of work; some require speed, others power, and still others both. The General Electric Co., which has made a specialty of this work, have scores of these small motors for every conceivable purpose. We illustrate a few, showing a variety of work done. The machine is started by simply turning a small switch or lever and as quickly stopped.

Joseph Jefferson went hunting recently and killed some wild geese. At the close of dinner next day he said: "When we sat down, my children, you noticed a goose stuffed with sage. Now you may observe a sage stuffed with goose."

The Rev. C. C. Carpenter of the Trinity Church, Meriden, Miss., broke his shoulder in a bicycle accident, and his wife preached the Sunday sermon.

CONVENTION BY LONG DISTANCE TELEPHONE.

Farmers 40 Miles Away Remain at Home and Hear Proceedings of Meeting.

Kankakee county, Ill., enjoys the distinction of being the home of the first political convention by long distance telephone. When Congressman A. J. Hopkins addressed the Kankakee county Republicans a few days ago, 200 farmers, at points from 15 to 40 miles distant, heard his remarks almost as distinctly as if they had been included among the enthusiastic hundreds at the Kankakee court House. On a desk near where the speaker stood a specially equipped telephone instrument was stationed which was connected with wires running to farmers' houses all over the county. The transmitter was held in such a manner that not a word of the congressman's address was lost by the 200 farmers who in different parts of the county pressed the receivers to their ears.

That the farmers might lose none of the proceedings Manager Robert Knapp of the Central Union Telephone company, repeated all the nominations, so that they too were telephoned broadcast over the wires and all the rousing applause that greeted the names of favored candidates was plainly heard by the farmers in their homes.

CORK AND WHERE IT COMES FROM.

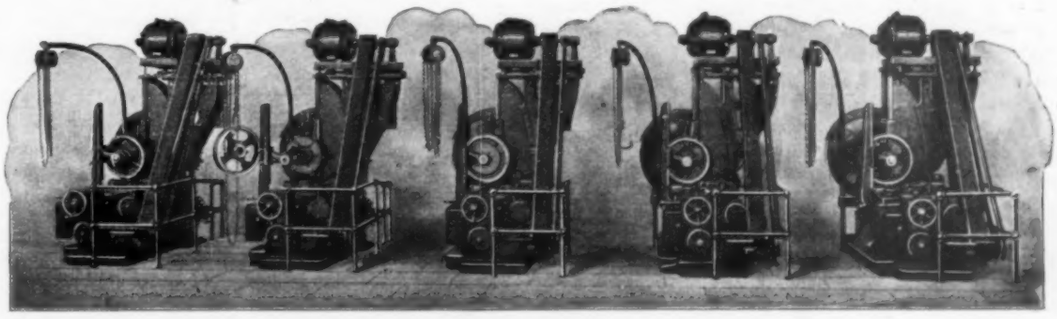
More than one-half the world's supply of cork is furnished by France and her North African possessions. The entire production, estimated at 2,204,000 pounds, comes from those countries whose shores are washed by the Mediterranean sea and the Atlantic ocean, extending from Morocco nearly to Bordeaux. The only producing countries, therefore, are Portugal, Spain, France, Italy and North Africa (Tunis, Algeria and Morocco). The corks with which champagne bottles are stopped come from Catalonia, which probably produces the finest cork.

Cork is the outer bark of a glandiferous tree. It is a thick, rough, fungous cleft bark. This outer bark is taken off and a new epidermis is formed, which in six or seven years becomes fit for use.

Eighty-five per cent of the total consumption of cork is absorbed by the United States, Great Britain, France, Germany and Russia. The demand is increasing every day and it may soon exceed the supply. A fortune awaits the man who may devise a wood pulp or other composition that will serve as a substitute for cork.

The town of St. Ulrich in the Tyrol, is inhabited solely by sculptors. All the men, women and children there and in the neighborhood live by sculpture.

Man averages 5½ days' illness a year between the ages of 21 and 30 years; 7 days between 30 and 40 years; 11 days between 40 and 50, and 20 days when he is between 50 and 60 years old



Gear-Cutting Machines Driven by Motors.

Easy Electrical Experiments
FOR BOYS

By L. P. Dickinson

CHAP. XVII. HOW TO MAKE A 1/20 H. P. MOTOR.

WINDING THE FIELD MAGNET.

Having made the frame of the field magnet, the next thing is to wind the coils of wire upon the frame, which are to excite the magnet. For this purpose there will be required four pounds of No. 16 double cotton covered magnet wire. Make also four pieces of wood, ⅛ inch thick, 3¾ inches long, and 1½ inches wide. In the middle of each of these cut a slot ¼ inch wide and 2½ inches long. These are to form the ends of the coils of wire and are for the purpose of holding the wire in place. Smooth them off nicely with sand paper, and round the corners a little. Unclamp the magnet frame from the iron block and clamp the two pieces forming one side firmly in a vise. In this way they are firmly held in position until the wooden strips just mentioned are in place, and the wire is wound.

The manner of fastening the strips in place upon the core is shown in Fig. 1. Make four strips out of fairly thick sheet iron, ½ inch wide and 3 inches long. These are shown at S in Fig. 1. With a knife, cut away a little from the inside of the slots in the wooden heads of the coil so that they will slip on to the iron cores and at the same time allow the strips of sheet iron to be inserted between the iron and the wood. Then bend the ends of the iron strips up at right angles, so that there will be a free space between the wooden strips 2 inches long. There should

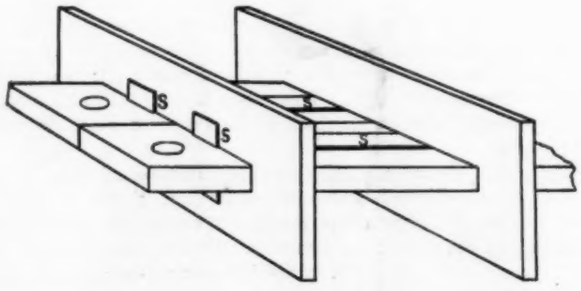


Fig 1

be two of the iron strips on each side of each iron core. Now slip the strips and the pieces of wood mounted as in Fig. 1 along the iron core so that the upper one is 1 inch from the upper end of the iron core. To fasten it there, apply a coating of glue (not mucilage) to the surface of the iron between the wooden strips, and wrap firmly around it two layers of heavy paper, two inches wide. This paper is for two purposes. First, it holds the iron strips and the wooden heads firmly in place. Second, it protects the iron core so that the wire to be wound upon it shall not touch the iron.

In the space thus formed on each pair of iron cores is to be wound 10 layers of the magnet wire already mentioned. In starting the winding bore a small hole through the lower of the wooden strips close to the core, on the outside of the frame. Through this hole pass the beginning of the wire which is to form the coil. Then wind ten layers very smoothly and evenly. It will be necessary to hold the iron core firmly in this and the other operations by clamping one end of it in a vise. After the coil is complete, fasten the outer end so that it cannot uncoil, and then put the frame together by means of the bolts at the top. Connect one terimnal of one coil to the one terminal of the other in such a way that the current going around one coil in a certain direction will go around the second coil in the opposite direction. That is, the current would trace an imaginary letter S in going around the two coils. The appearance of the finished magnet is shown in Fig. 2.

The supports for the shaft next claim our attention. Direc-

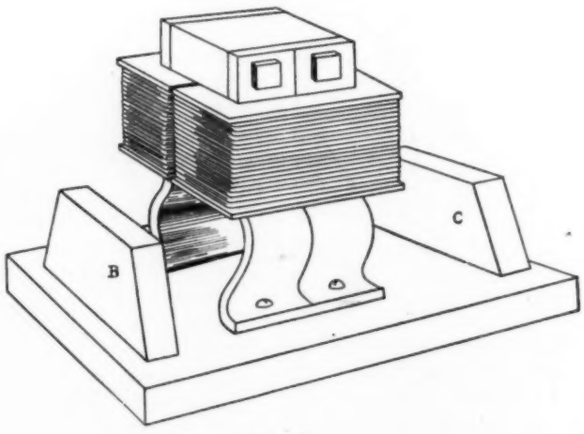


Fig 2

tions were given in the preceding paper for mounting the field magnet upon the base board. At one end of the board, and at a distance of 2⅝ inches from that end of the field magnet, mount a piece of wood, cut from a board ⅝ inches thick. This piece of wood is tapering in shape, being three inches wide at the bottom, tapering to two inches in width at the top. Its height is 2¼ inches. It is to be placed so that its center is on a line drawn lengthwise through the center of the board, and is at right angles to this line. It is fastened to the board by screws passing upward through the base board. The distance of 2⅝ inches mentioned is measured between the end of the magnet frame and the inside edge of the upright strip.

At the other end of the board is another exactly similar piece, only it is at a distance of 1⅜ inches from the magnet frame. These uprights are shown at B and C in Fig. 2.

(To be continued.)

THE SCHOONER AS A MONEYMAKER.

There is more money in the multi-masted schooner, according to recent calculations, than in the steel freight steamer. The Marine Journal says:

Actual figures of voyages show gross earnings for a five-masted schooner carrying 3,600 tons of coal of $11.11 per ton, while the actual expenses were $6.66 per ton, leaving a profit of $4.45 per ton on the year's business.

A steamship of equal cargo capacity would earn on 36 voyages at 60 cents $21.60 a ton, while the expenses would be about $16 a ton, leaving a profit of $5.60 per ton on the year's business. This difference in favor of the steamship would be offset by the fact her original cost is $55 per ton against $27 per ton for the schooner, the advantage to the latter thus being $26.40 per ton carrying capacity.

Thomas W. Lawson is to be the name of the world's first seven masted schooner, told of in Popular Mechanics March 15, now nearing completion at the Fore River shipyard, Quincy, Mass.

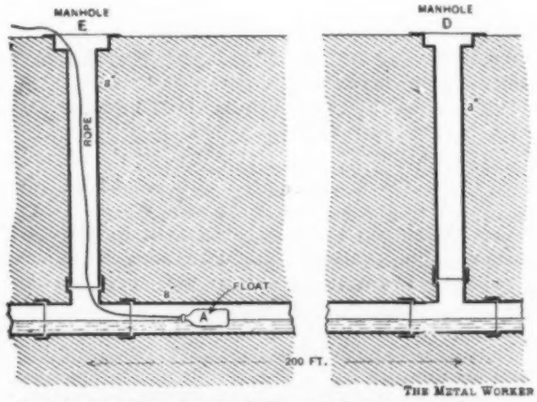
A Burlington train made a run of 14.8 miles from Eckley to Wray, Col., recently at the rate of 98.6 miles an hour. The Continental Limited of the Wabash has made a new record from Tilton to Granite City, making 180 miles in 180 minutes including stops.

SAY WHISKERS DISSEMINATE DISEASE GERMS.

Whiskers are collectors of dangerous disease germs, according to New York scientists and their wearing should be prohibited. The Milk Commission of New York has, in consequence, taken steps to force milkmen to shave off their beards lest they convey germs to the milk. Nothing is more detrimental to the public health, it is claimed, than the wearing of beards by doctors, and every municipality should force its practicing physicians and surgeons to be clean shaven and wear skull caps when attending patients. Long whiskers, according to this latest sensational discovery, are more to be feared in the dissemination of contagion than the rat, which has been known to carry plague from the country to another. Germs of divers degrees of danger are said to cling to the whisking whiskers as fragments of loadstone would cling to a needle.

CLEANING SMALL TERRA COTTA SEWER PIPES.

In many cities terra cotta sewer pipe of six to twelve inches in size has been laid on side streets. When these become clogged up considerable difficulty is often experienced in removing the obstruction on account of the small size. More often the trouble



Flushing and Cleaning Small Terra Cotta Sewers.—Fig. 1.—Floating a Line Down to Draw Cleaner.

occurs between the house and street in pipes of four or six inches diameter.

The Metal Worker, in a detailed article April 12 tells how to clean the pipes. The two illustrations give an idea of an easy way to open the pipes. A float of wood or an empty bottle is put in at the upper manhole E and floated to manhole D, where it is fished up and by means of the cord the flexible cleaner is

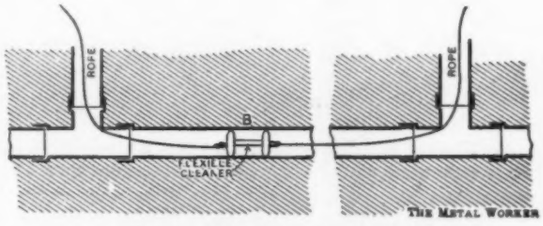


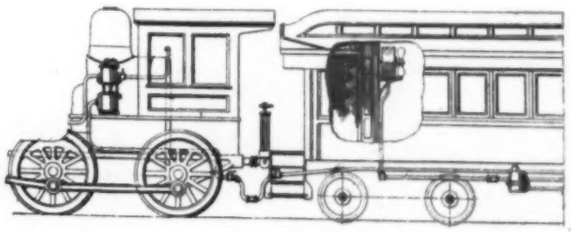
Fig. 2.—Flexible Cleaner in Use.

drawn through as seen in Fig. 2. This flexible cleaner is the full size of the pipe and is drawn by a strong cord. The float first sent through may be small and draw a light cord.

In England and Wales more than 60,000 persons die of consumption annually and the deaths from this disease throughout Europe are more than a million a year.

FANS IN RAILWAY CARS DRIVEN BY COMPRESSED AIR.

R. M. Dixon, of East Orange, N. J., has invented a system of using air compressed on the locomotive as a means of driving fans and in the coaches of the train. As the present system of

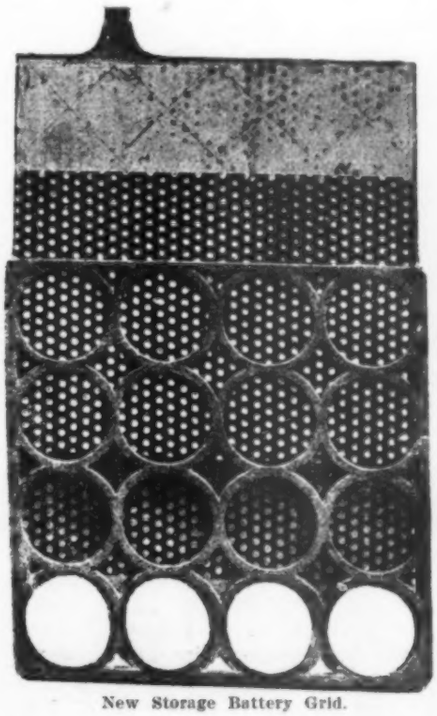


Compressed Air to Cool Cars.

air compression on most roads would not admit of air being diverted to drive fans the inventor preposes to place a compressor on the left side of the locomotive and conduct the air through the steam pipes which of course, are not in use in summer when fans are needed.

STORAGE BATTERY FOR AUTO GAS ENGINES.

A new storage battery to furnish ignition by electric sparks for the gas engines of automobiles is described in the London Electrical Times. It is known as the "Armored" accumulator, and is inclosed in a celluloid case. Each plate consists of a pasted lead grid of very light section, which gives a maximum of active capacity for the size of plate employed. Around this



New Storage Battery Grid.

plate is an envelope or case, chiefly consisting of circular holes surrounded with lead. This envelope gives the necessary strength and mechanical support to the grid. Between the case and the grid itself, on both sides, is placed a sheet of perforated ebonite or celluloid. These act as separators, entirely preventing the paste from falling out of the grid, and from causing a short-circuit through bridging across the plates.

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POPULAR MECHANICS

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A commission of experts representing the cotton manufacturers of Lancashire, Eng., have come to the United States to investigate the cotton industry in America.

New Orleans is trying to get the next convention of the National Association of American manufacturers.

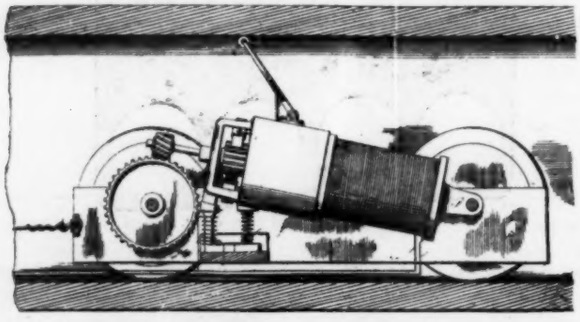
The Chicago Presto's Blue Book of the Music Industries, entitled, "The Buyer's to American Pianos, Organs and Other Musical Instruments," is just off the press. It is a handsome conception and a worthy effort.

St. Louis is to be made the headquarters of the consolidated hardware companies, of which E. C. Simmons, of the Simmons Hardware Co., will probably be the president.

J. E. Butler, an educator of Bessemer, Mich., says that every school and college should be equipped with a stage for theatrical performances as a means of instruction in history.

ELECTRIC MACHINE FOR DRAWING WIRES INTO CONDUITS.

A miniature trolley car for drawing cords or wires into conduits is the invention of a Philadelphia man. A small electric



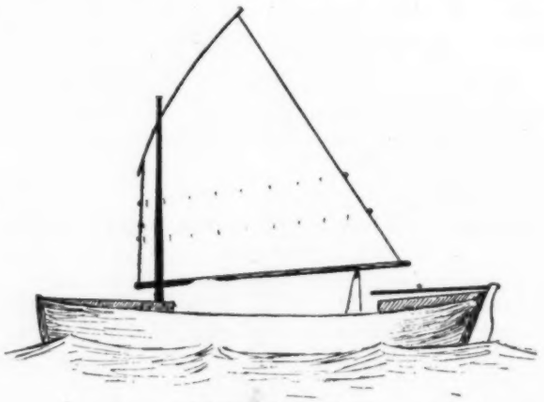
Motor Drawing Wires in Conduit.

motor taking current from overhead is geared to the axle of one pair of wheels and the return circuit is made through the rails on which the machine travels.

BOATS FOR PROSPECTORS.

A great deal of prospecting for woods and metals is being done this year along the bays and inlets of the shores of British Columbia. The Mining Record of Vancouver, in a report from Herbert Carmiachael, government assayer, says of the prospector's boats.

These craft were built of a considerable size considering that



Prospector's Boat.

they were invariably cut or dug out from a single cedar tree, being often 40 feet long by 1 feet beam, but it must be remembered that a canoe with 7 feet beam could be made out of a cedar having a diameter of only 6 feet.

This was accomplished, after hollowing out the canoe by fire and chipping, by filling it with water and heating the water by throwing in hot stones; then while the wood was soft and pliable forcing out the sides with sticks acting as stretchers.

A danger is always present with cedar canoes. They may split in a sea from end to end: this is more liable to occur when the canoe is old and the bottom has worn thin.

It is doubtful if sails were used by the Indians before the advent of the white man. Those used now are a sprit sail of rectangular form with a long gaff, this is kept from falling off the wind by a line from the peak, in fact it is the end of the main sheet carried to the peak and forming a loop.

It appears to be only a matter of a few years till the canoe, as now used, will disappear and the Columbia river boat will take its place. The Indians are getting quite expert at the building of these boats, which are usually from 20 to 26 feet long.

BIRDS OF MYSTERY HAVE COME AGAIN.

The Evening Grosbeak, known as "the bird of mystery," has made its appearance in the vicinity of Chicago this spring in large numbers, after an absence of many years. As a result, all the woodlands in the vicinity are thronged with ornithologists anxious to study these strange birds, which have no system in their migration and which seem to disappear from an entire country almost in an hour. It is useless to search for a Grosbeak in the afternoon. They keep up an awful chattering throughout the woods until noon, when not another note issues from their throats and they seem to vanish as completely as if swallowed by the earth. Where they hide themselves during the afternoon hours is a mystery. Although there have been hundreds of expeditions in the quest for years past, until last June but one evening Grosbeak's nest had ever been discovered. The first and only man to find their nests during the nesting period and discover the secrets of their methods of rearing their young was Francis J. Birthwell, the ornithologist, while traveling in Mexico. While trying to descend from the tree in which the nests were discovered his feet became entangled in the rope and he was hanged. His death was a severe loss to the ornithological world and adds an additional interest to the birds of mystery.

LOCOMOTIVES OF A CENTURY

[Being an illustrated history of locomotive invention, building and progress. The facts are taken from a paper by S. M. Vauclain, read before the New England Railroad Club. The illustrations were gathered and engraved by the Baldwin Locomotive Works, by whose permission they are used.—Editor P. M.]

The year 1838 marked the beginning of a new era in railroad building. It was then that Norris made his supreme effort for the Baltimore & Ohio railroad resulting in the construction shown in Fig. 16, which exemplifies many of the leading characteristics of

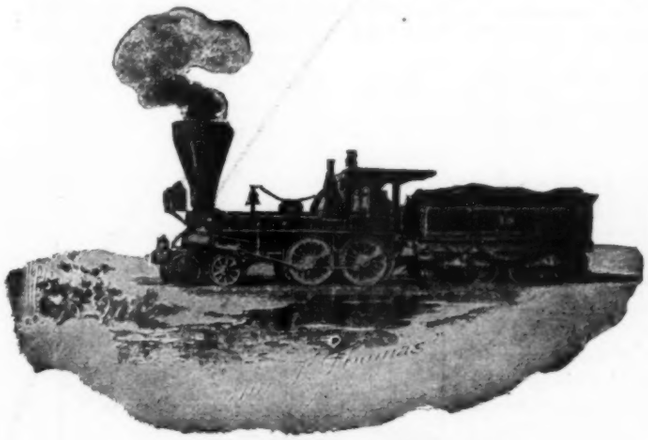


Fig. 16.—Norris Locomotive, 1838.

the modern engine. In 1840 American locomotives were exported to England. The first of these were built by the Norris Loco-

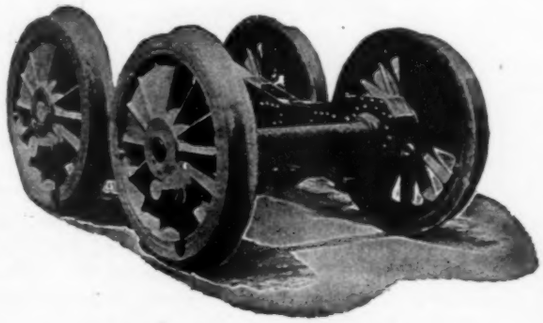


Fig. 17.—Baldwin's Flexible Beam Truck.

motive Works of Philadelphia, now absorbed by the Baldwin Locomotive Works.

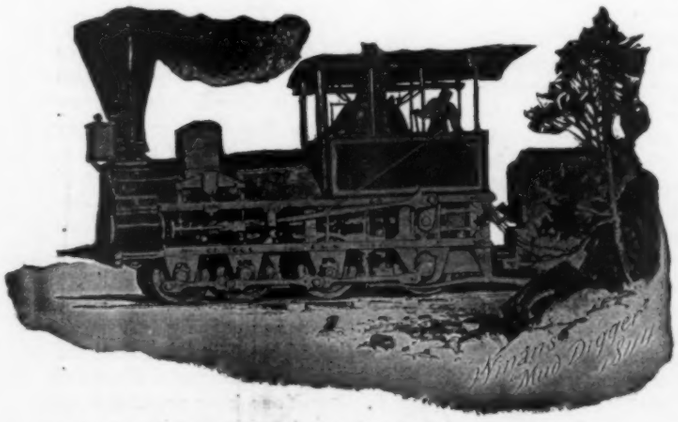


Fig. 18.—Ross Winan's Eight-Coupled Locomotive, 1844.

In 1844 the first eight-coupled freight locomotive (Fig. 18) appeared. It was built by Ross Winans, whose name stands high among those who have advanced locomotive building during the 19th century. In 1846 Mr. Baldwin introduced his eight wheel locomotive connected with flexible beam truck (Fig. 17) for freight service. This was so successful that it was not until 1855 that Mr. Baldwin was finally prevailed upon to abandon this design and place the cylinders horizontally.

In a design for a locomotive with horizontal cylinders Winans

Fig. 20.—Winan's "Delaware" with Horizontal Cylinder, 1846.

once more succeeded where many had failed. His engine shown in Fig. 20 was built in 1846. It was the first locomotive to burn anthracite coal successfully, and thus enabled the Reading railroad to haul coal to Philadelphia by burning coal instead of wood.

LAW POINTS FOR EMPLOYER AND EMPLOYED.

Where an employe is serving under a contract providing for

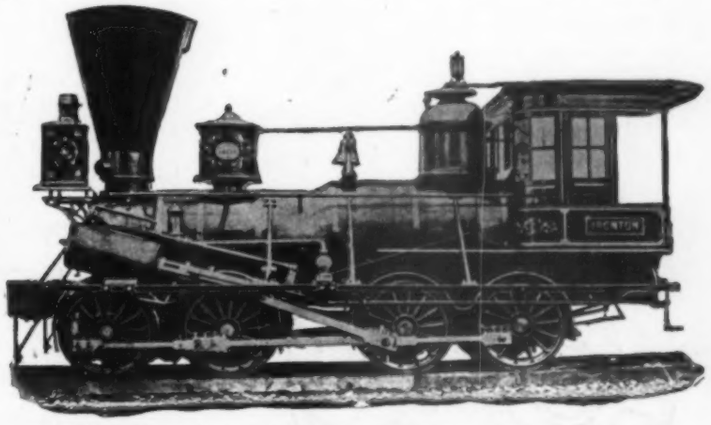


Fig. 19.—Baldwin Eight-Coupled Locomotive with Flexible Truck.

his discharge should the employer "find" the employe "unfaithful or improper in the performance of his duties," the employer cannot arbitrarily discharge him. (72 N. Y. S. 1095.)

One who works during the dinner hour does not for that reason alone become a volunteer, so as to relieve the employer of liability for an injury to him resulting from defect in the premises. (65 S. W. R. 835.)

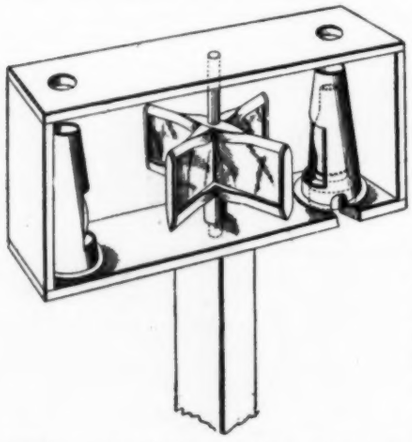
An employer must furnish reasonably safe appliances required in the work he engages workmen to perform, and keep them in good repair. (30 So. Rep. 889.)

Where an employe has knowledge of certain dangers incident to the employment, the failure of the employer to give adequate warning of such dangers does not render the latter liable for an injury resulting from same. (65 S. W. Rep. 693.)

It is the positive duty of the employer, which he cannot delegate so as to relieve himself from a failure to discharge it, to use reasonable care to place fit and competent persons in charge of his work. (111 Fed. Rep. 330.)

A MECHANICAL SCARECROW.

A curious machine has been invented by Alexander C. Davis, of Lafayette, Ind., to take the place of the time honored scarecrow which has about outlived its usefulness. The new device consists of a box



incasing four bright paddles which are turned by the wind, and in revolving reflect shafts of light from two lamps which burn in either end of the box. The box may be placed at considerable distance from the territory to be guarded and set so as to throw light in the direction most desired.

"EELS" IN WHEAT AND FLOUR.

Here is a new kind of microbe to add to the constantly increasing collection of the microscopic menagerie. This one has a well developed Latin name, but in plain language is a wheat eel. In form it is a miniature salt water eel. It is at home in the wheat seed and retards the forma-

tion of starch in the kernel, giving it a pepper-like appearance, says the American Miller. It is also found in the flour made from such grain. There may be several hundred of them in a pinch of flour the size of a pin head. It is getting to be an almost impossible thing for a person to be a real Simon-pure vegetarian.

Bishop C. H. Fowler, of New York, claims to have traced the late President McKinley's genealogy back to the first king of Ireland.

SURE TRICK TO CATCH BASS.

William Humes, Minnesota's most successful guide, has long held a secret for catching bass, which worked with wonderful results. Humes always rows his employer past many lily beds and other likely places and will keep on rowing until he can find a single lily pad growing from 20 to 30 feet out from its fellows.

"Cast from here," he then commands, "and land within three feet of that pad; let your bait sink deep before you begin to reel in, and reel slow."

The angler will in eight cases out of ten get a savage strike before he has taken in two yards of line, and will have a fight lasting from five to fifteen minutes. Cast after cast will have the same result until sometimes half a dozen black bass have been taken, and in no case will the bait have struck more than six feet from the solitary pad. Then Humes rows on in search of another place of the kind. His theory is that water minnows, undersized croppies, and such fry are curious and assemble about the lone lily pad to find out about it. The bass congregate there to feed upon these small fish. He always uses live frogs for bait in such fishing as he says the bass are tired of the minnows.

MURPHY S ORDERS.

Murphy was a raw recruit who joined the cavalry without ever having rode a horse in his life. Of course he got the worst bucker in the whole troop.

"Now, my men," said the sergeant, "no one is allowed to dismount without orders from a superior officer. Remember that."

"Murphy," shouted the sergeant, when he discovered the man spread out on the ground, "you dismounted."

"I did."

"Did you have orders?"

"I did!"

"From headquarters, I suppose?"

"No, from hindquarters."

"Take him to the guard-house!" ordered the sergeant.

INVENTIONS TO NO PURPOSE.

Every week from one to three patents are granted for non-refillable bottles. There seems to be a general idea throughout the country that a fortune awaits the perfect bottle which cannot be refilled. As a matter of fact there is no demand for such a bottle and inventors are simply wasting time, effort and money in trying to perfect something nobody wants.

FROM A CANADIAN BOY.

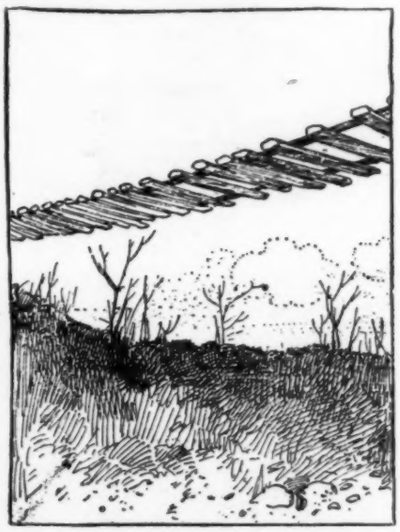
John W. S. McElroy, Canton, Ont., writes: "I like the paper very much, as it is 'written so you can understand it,' especially the Electrical Experiments for Boys, which I am following up."

MUNICIPAL OWNERSHIP FOR NEW ORLEANS.

New Orleans has voted for municipal ownership. Bids have been received to furnish the city with light for ten years for $2,648,000, and at the beginning of the eleventh year the entire plant becomes the property of the city. At present New Orleans is paying $2,215,000 for lights for ten years, but without the prospect of eventually owning the plant. A more important economy yet is that the bid specifies for the construction and illumination of 1,000 more arc lights than are at present in use.

RAILWAY HANGING IN MIDAIR.

A railway track hanging high in the air is the remarkable result of a washout on the Italian railway near Brindisi. The huge embankment spanning the deep val-



ley had stood for more than 30 years, but exceedingly heavy rains turned the valley into a river and in spite of the culvert under the track, the whole of the embankment gave way. The rails and ties, as will be seen in the illustration, were left intact hanging in midair.

FEAR THE ILLINOIS MAY BE BLOWN UP.

Dangerous ammunition hoists on the Battleship Illinois, which is to represent the United States at King Edward's coronation, leads to the fear that the ship may be blown up if the position of the motors is not changed. It has been discovered that the electric motors for boisting ammunition are located inside the magazines instead of on the outside as they should be. The result is that every sparking of these motors leads to much apprehension regarding the safety of the magazines which are full of smokeless powder of a highly inflammable character. Electrical experts in New York have urged that an alteration be made without delay.

SHOP NOTES

PRINCIPLES OF THE STEAM INJECTOR.

When J. H. Giffard, the inventor of the steam injector, tried to introduce the instrument, says the Practical Engineer, he was told to read the first rules of motion; that he must be mad to suppose that steam from one part of the boiler would force its way back into another part of the same boiler. For nearly a year he could not obtain authority from anyone to even give his invention a trial, and then he was permitted to apply it to a locomotive with the idea of proving to him that such a thing was impossible. The action of the injector is similar to that of the blast pipe in a locomotive. The rush of steam in this case forms a partial vacuum into which air is forced by the atmospheric pressure of 15 pounds per square inch.

Fig. 1.—Injector.

Giffard took a pressure of 100 pounds per square inch, and showed that a column of water 2 3-10 feet high presses upon its base with a force of one pound, therefore 100 pounds pressure is equal to a pipe of water 230 feet high. Now water will rush from the bottom of such a pipe at a speed of no less than 83 miles an hour.

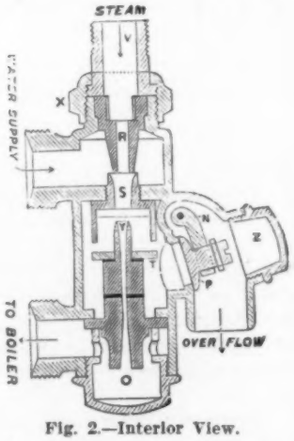


Fig. 2.—Interior View.

A boiler having a pressure of 100 pounds per square inch is just balanced by a jet of water flowing at 83 miles an hour; then to overcome the steam in the boiler it is necessary to increase the speed of the water to 83 miles per hour.

The steam chest of a locomotive is actually under greater pressure than the boiler; this is due to the momentum with which the steam flows through the pipes.

In the same manner the velocity of the steam through the injector is so great that it not only has force enough itself to enter the boiler, but also it carries the water with it. Under favorable circumstances it is even possible to force it into a boiler having a higher pressure.

Fig. 1 shows the interior mechanism of a Penberthy steam injector. V is the tail pipe, X, coupling nut; R, steam jet; S, suction jet; Y, delivery jet; T, ring; O, plug; Z, overflow cap; P, overflow valve; N, overflow hinge.

HOW TO TREAT A BELT.

The man who will put resin on his belt is either a fool or a knave, says Rex in Power. The belt is less generally understood than probably any other staple mechanical appliance. No person ever bought a cheap belt that was a good belt. The utility of belts may generally be gauged by the price paid for them and when you induce some one to sell you a belt at a lower figure than the price first quoted, you, not the dealer, are the loser.

Often belts are made uneven, and with the best of care, soon get out of shape. We sometimes find a belt that ordinarily runs easy on the pulleys, suddenly incliped to run to either one side or the other of the driven pulley. Either the belt has been too slack or the load has been increased from want of lubrication or other cause. In either case it will run off if you insist on applying the power. The remedy would be to either take up the belt, thoroughly oil the journals or take off the extra load—maybe a combination of all.

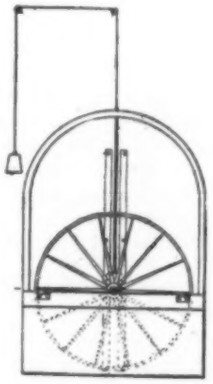
Then the belt may run to one side of the driven pulley when the driven shaft gets out of line with the driving shaft. In this case the belt runs to the low side of the pulley.

If two shafts are parallel and there is a high place on the pulley, then a belt will run to the high place; but if the shafts are out of line and the face of the pulley straight, then the belt will run to the low side or that closest to the driving shaft. The remedy would be to line up your shafting.

W. K. Vanderbilt, Jr., has announced in Paris that he will take his automobile over the Paris-Berlin course this summer in an effort to beat Fournier's famous record.

WHEEL PAINTING MACHINE.

In factories where buggies and wagons are made many parts of the vehicles receive their coats of paint by being immersed in a tank of paint. Here is shown a recent invention for treating the wheels.



The wheel is suspended in a covered arched hood and the wheel dipped in the paint tank. Then it is raised out of the paint and the wheel rapidly revolved by means of a hand crank. The surplus paint is thrown off against the hood and runs back into the tank to be used again.

WHAT A B. T. U. IS.

One of our readers asks the definition of B. T. U.

These letters stand for British Thermal Unit, which is the quantity of heat necessary to raise the temperature of one pound of water one degree Fahrenheit at its point of greatest density, which is 39 degrees Fah.

LARGEST CHAIN IN THE WORLD.

The Lebanon, Pa., works of the Standard Chain Company, of Pittsburg, have just completed the longest and most powerful chain ever made. A second of the mammoth chains is to be turned out as soon as possible and both will go to the Eastern Shipbuilding Co., of New London, Conn. They are to be used on two great vessels to ply between San Francisco and Japanese ports.

The big chain is what is known as a cable chain of 33-16 stud-link. It is 2,000 feet long, and withstood the strain of a new 600,000-pound testing machine at the works of the Philadelphia Machine Tool company. The test was witnessed by several experts, including a representative of the British Lloyds Register association.

The will of the late Col. John W. McKee, who died recently in Philadelphia, conveys $2,000,000 for the erection of a Catholic church, rectory and convent. McKee was probably the wealthiest negro in the world.

A DOCTOR'S "EVER-READY" AUTO.

A Brooklyn doctor who uses an automobile in his practice found that he experienced great delay in getting up steam after receiving a call. An inegnious invention of his is the result. From the wall of his stable hangs a rubber tube terminating in a gas burner, says the Motor Age. On arriving home he places the burner dimly lighted under his boiler. The gas is controlled by a small tap in his bedroom. When the physician receives a sudden call in the night he turns up the gas and by the time he has dressed and reached the stable has enough steam up to start away immediately after lighting his burner.

AN ARITHMETIC FOR ADULTS.

A long felt want is filled in a simple, comprehensive arithmetic for everybody, published by George A. Zeller, Room 592, 18 S. 4th street, St. Louis, Mo. It is called Spangenberg's Practical Arithmetic. The volume is in no respect a text book, but is a manual for the adult containing just such handy information as he needs in his industrial pursuits, trades and sciences.

REAL CRUSOE FOUND OFF COREA.

The steamship China brought to Honolulu the story of a real Japanese Robinson Crusoe, who lived for 17 years on a deserted island near Gensan, off Corea. The man was discovered by the Japanese master of a fishing schooner, who thought him a monster from his wild appearance and did not dare land. He reported to the Japanese government, which sent a torpedo boat in search of the mysterious man on the island. He was found and brought back to Nagasaki. The man had been so long without companionship that he was reduced almost to imbecility. His hair and beard were long and unkempt, and he had almost lost the power of speech. He had been cast away on the island 17 years ago and had subsisted since that time on seaweed and fish, living in a cave. He was entirely without implements of iron or any means of utilizing the scanty materials of nature which the island furnished.

NEW HARBOR FOR AUSTRALIA.

An outer mail steamer harbor is to be constructed at the entrance of the Port Adelaide river at Light's Passage, Port Adelaide, New South Wales, Australia, says the Journal of Commerce of Melbourne, Australia. It is proposed to straighten the channel at its mouth and make it 400 feet wide at bottom, with a heavy wall of stone 7,000 feet long on each side behind the wharves. The work will cost about $2,500,000.

There is one titled personage to every 100 commoners in Russia.

GERM PROOF ARMOR FOR PHYSICIANS

A germ proof armor which enables the wearer to defy the presence of the most deadly contagions is now worn by physicians in attending patients in pest houses and by embalmers in preparing the bodies of those who have died of dangerous contagious disease. It has proven of great value in preparing infected premises for disinfection.

The armor is called a disinfector's suit, and is manufactured by the Durfee Embalming Fluid Company, Grand Rapids, Mich. It is more serviceable in protecting the physician against germs than is the bullet proof armor in protecting the soldier

German Proof Armor.

from bullets of the enemy. There is no opening through which any one of the swarms of deadly germs exuding from the infected patient can enter the patient's system. The suit is made of canary cloth and white duck, and is in one piece. It is put on over the regular clothing and shoes. The hood draws snugly around the face by means of a cord. The mask is provided with isinglass windows through which the wearer may see and lintine over the mouth and nose which permits breathing. The lintine is saturated with a powerful disinfectant when in use and is absolutely impervious to fetid effluvia. The suit is drawn tightly at the arms and feet by means of rubber gathering cords, and rubber gloves are worn. The suits may be bought for $6 or $7 each.

Alcohol impedes growth. The abuse of meat in the case of very young people also impedes growth. Salt water helps the development of growth and baths in water containing sea salt are very beneficial.

MOVING SAFES WITH AUTOS.

An automobile truck is now employed for moving iron safes. It has two propelling motors and a third elevates the safe to its place in the building. It requires three men and six and a half minutes to place a safe on the seventh floor. Formerly it required eight men two and a half hours.

CARRIER PIGEONS IN COAST FISHERIES.

A cold storage company on the Pacific coast employs carrier pigeons in determining the amount of fish received at the various stations. The birds are carried to the fishing stations each day, says the Fishing Gazette, and released early the following morning with notes giving the amount of fish received at the different stations during the previous night. French fishermen use pigeons extensively for the same purpose in the sardine and other fisheries.

DON'T BE A KNOCKER.

The following is going around in the Kansas newspapers. It is good advice anywhere. Read it and see: "If there is any chance to boom business, boom it. Don't pull a long face and get sour in your stomach. Get a smile on you. Hold up your head. Get a hold with both hands, then pull. Bury your hatchet. Drop your tomahawk. When a stranger drops in, jolly. Tell him that this is the greatest town on earth. It is. Don't get mulish. Don't roast. Just jolly. No man ever helped himself by knocking other people down. No man ever got rich trying to make people believe that he was the only man on earth. You can't climb the ladder of fame by stepping on other people's corns. They are their corns, not yours. And they're tender. Keep off the corns."

LABORATORY FOR STUDY OF LAKE FISH.

A government laboratory for the study of fish of the great lakes is to be established at some point in Illinois, Indiana, Michigan, Wisconsin, Minnesota, Ohio, Pennsylvania or New York. The site is to be selected by the United States fish commission. Senator McMillan, who at the direction of the Committee on Fisheries at Washington, has reported favorably on the bill, said:

"The important commercial fisheries carried on in these waters warrant the establishment of a laboratory at which the various biologic-economic problems connected with the prosecution and development of the fisheries may be studied. Such a station would be a valuable adjunct to the fish cultural work carried on by the government and the various states."

FOR THE MADAM

A SENSIBLE CASTOR.

A ball bearing castor is now being made, the working and construction of which is shown in the cut. It cannot possibly tear a hole in carpet or rug, as it

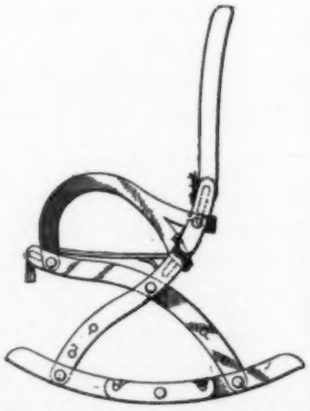
is free to roll in any direction and is center bearing. The upper part is a spring which prevents dropping out, but allows the castor to be easily withdrawn when desired.

REMOVING PAINT FROM OLD OAK.

Dissolve as much potash in hot water as the water will take, and, while still hot, stir in sawdust so as to make a fairly stiff paste. Spread this an inch thick over the wood, and after a few hours the paint or varnish will wash off with cold water. If necessary, the process can be repeated on any part. This will not hurt the oak, though it may for the time being give a whitish tinge; but rubbing over with boiled oil will restore the full natural color.

FOLDING ROCKING CHAIR.

A rocking chair which can be folded up to occupy a very small space has been in-



vented by W. T. Seemp, Pocahontas, Ark. The cut fully explains its operation and construction.

LET CHILDREN MAKE MUD PIES, HE SAYS.

In summing up the misfortunes of the children of the wealthy, Percival Chubb, at a meeting of the Society for the Study of Life in the Tuxedo in New York, said:

"Our wealthy children are disreputably clean—too much tutor and too little father; too much clothing and too little mother, too much boarding school and too little home. They are little patterns of anaemic primness. They exist merely for their clothes. A good roll in the mud is what they need. Mud pies, that blessed institution of happy normal children, would be their salvation. Parents must decide whether the upholsterer, the tailor or the child shall rule the home."

UNIQUE HOLIDAY HOTEL MENU.

Walter H. Maxwell, manager of the Palace Hotel, Cincinnati, is noted for his original ideas. The latest of these is exemplified in his unique conception of holiday menus. On the page opposite the list of dishes, says the Hotel World, he publishes a history of the holiday, why it is celebrated, etc. Thus he explained Easter Sunday as being the "most important movable Christian church holiday," and he showed that Easter can never come before March 22, nor after April 25.

SULTAN OF MOROCCO BARS AUTOS.

Believing he has discovered in the automobile a French plot to end his life and annex his territory, Muley Abdul Azziz, Sultan of Morocco, has prohibited the use of the machines in his country. The sultan was recently presented with a French automobile and after a few trips declared it the best thing he had ever seen. One day he was out taking a spin and the steering gear became disarranged. His machine got to going and he could not stop it. One of his tires burst but the sultan kept on going. Then he hit a big rock. The automobile stopped but the sultan went on. He was not seriously injured, but when his chaffeur could not explain to his satisfaction how the accident happened, the Sultan grew angry. He sent for his blacksmith and ordered the machine broken up. Then he issued a decree prohibiting the use of automobiles by any of his subjects. He has long had the idea that the French longed for his country and is firm in his belief that they had schemed to bring about his death by means of their automobiles.

Because it was held that the light in the statue, "Liberty Enlightening the World," in New York harbor, is of no commercial value, a proposition to appropriate funds for lighting the torch was defeated in the House and the torch is to remain dark.

THE SOLILOQUY OF THE HASH.

The hash lay on a plate.
"I am a thinking entity," it said.
"I'm lying here in state;
"I am alive, altho' my parts are dead."
It felt a sudden thrill,
Then rose a clamor shrill:
"Oh, hold you're rash;
We parts are still ourselves, altho' in hash."
Murmured the Mutton: "Ah, how yellow were
The cowslips in the fields; how passing fair
Was all about when I, a merry lamb,
Began the life which led to where I am!"
Said the Potato: "Warm was the brown earth
Of the bright hillside where I had my birth:
What joy of growth within my bosom welled,
How curled my tendrils, how my tubers swelled!"
And mused the Beef: "How green our Texas plains!
With what a novel grandeur nature reigns,
What vast expanses! how our pulses stirred
As we swept onward in a mighty herd!
I see the flying steeds, the sudden dash"—
"Mee—ow!"
"Bow-wow!"
Said the rest of the hash.

STEEL TIRE FIRE ALARM.

Worn out steel tires from the big driving wheels of locomotives are coming into use as fire alarms in New Jersey, says the Fireman's Herald. These tires are hung

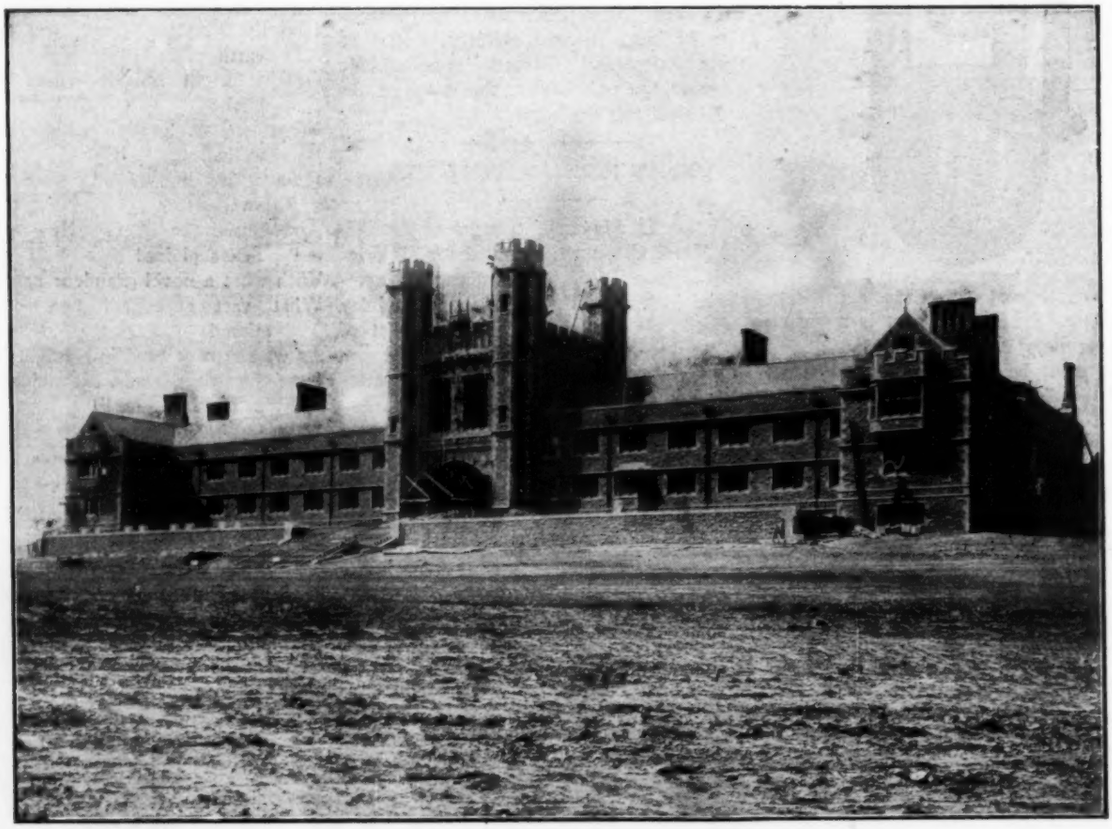
in a tower and a striker attached to be worked either by hand or electricity. The towers are from 50 to 80 feet high. When struck a quick blow with an iron tongue or hammer a tone is produced which is extremely penetrating and can be heard a long distance.

An appropriation of $15,000 is to be made for the establishment of storm warning signals at Glen Haven, Mich., and South Manitou and the construction of a telephone or telegraph line between the two points in the interest of navigation.

The National Railroad Company of Mexico, capital $65,350,000, has been incorporated at Salt Lake City, Utah. Its object is to build a railroad from Laredo, Tex., to the City of Mexico. Edward H. Warren, of New York, is president.

STUDENTS' HEADQUARTERS AT WORLD'S FAIR.

Of all the buildings that will comprise "the Mystic City" of the Louisiana Purchase Exposition those of the Washington University will probably be the only ones left standing after the big show is over. These buildings will be seven in number, built on 110 acres of ground. They are of red Missouri granite. Central and most magnificent of the buildings is University Hall, which will be headquarters for students who visit the world's fair from all over the world. The central entrance consists of a massive tower, 77 feet high, topped by four octagon towers, one at each corner. The tower and the octagon corners are battlemented with elaborate holdings in cut stone encircling the embrasures. In the western end of the university group will be located a large amphitheatre and gymnasium, which will be used for the physical culture exhibit and exercises during the exposition. University Hall will cost $210,000. The entire cost of the buildings is to be $740,000. It will be 325 feet long by 118 feet wide.



Students' Headquarters at St. Louis World's Fair.

The British Government has placed orders with the Clyde shipbuilding firms for four new fast cruisers and a battleship, costing in all $16,000,000.

An ordinary railway engine will travel about 1,000,000 miles before it wears out.

GIVEN AN ENTIRELY NEW FACE.

Rufus Janman, a Clover Leaf engineer, caught in a wreck near Kokomo, Ind., a year ago, is wearing a new face as the result of a marvelous feat in skin grafting. In the wreck the engineer had both ears burned off close to the head, his chin and nose were torn off, his eyelids cut off and his entire scalp torn away, not a hair being left on his head. After a year's treatment he was released from the hospital last week. For nearly 200 consecutive days Janman was on the operating table, where long strips of skin were cut from his legs and applied to the face. An occulist repaired the eyelids, making them as good as new. By degrees a new chin and nose were grown. The ears and hair could not be replaced, but a wig was given him, the long, flowing locks of which concealed the spot where the ears formerly were.

ONLY WOMAN HARNESSMAKER.

Miss Maud Dennison, 850 Cortland street, Chicago, is probably the only woman harnessmaker in the world, and is an expert at her trade. She has been admitted to membership of the United Brotherhood of Leather Workers on Horsegoods, having the distinction of being the only woman in the union, which has a membership of 10,000. Miss Dennison worked at the trade for four years. She was born in Louisville, Ky., and is 28 years old.

SQUIRRELS INJURE TELEPHONE LINES.

Squirrels which swarm in the stately trees of the university town of Madison, Wis., have worked serious damage on the telephone lines, according to the charges of the linemen and officials. Madison has been suffering from an exceedingly bad telephone service and the officials could not tell why it was. They have discovered that the squirrels have been dining on the tar cement and binding strings used for the insulation of the telephone cables. In many cases they have nibbled away the insulation, cut into the wires, making cross connections, and caused delay and worriment in other ways. The little beasts have been permitted to gnaw their way undisturbed into anything that took their fancy. Of late they have kept the force of linemen busy repairing damage, and have worked faster than the linemen, as there as many of them. The telephones have been in use for only a few years, but the squirrels have been there since the foundation of the school which dominates the town, and the chancellor and his professors would rather have the squirrels.

The town of Bandon,Ireland, is hopelessly insolvent. The gas works have been seized to satisfy a debt; the supply of coal and by products have been sold at public auction and the town is left in darkness.

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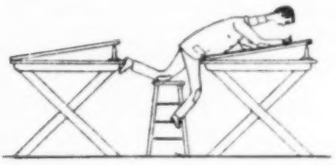
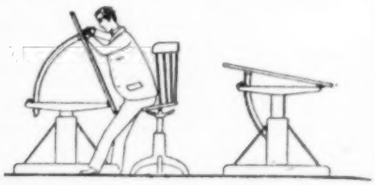
DO FLAT DRAWING TABLES MAKE LONG NECKS?

This is the question which a writer in The Draftsman discusses in an argument



against the use of the flat table for drafting work. He also illustrates the dire ef-



fects of the flat table and the comforts of an adjustable one.

HOW EXCELSIOR IS MADE.

Excelsior, which is an American invention, is made of bass wood and poplar. The logs are sawed into eighteen inch lengths and split in halves. A series of knife points run down the face of the block, cutting into the wood in parallel lines that are spaced according to the width of the fiber to be made. A following knife slices off the whole face of the block thus served. The fibers curl and commingle as the knife sets them free. An excelsior machine makes two hundred to three hundred strokes a minute, every stroke cutting off a tier of fibres across the face of the block.

FISHING ON A BIG SCALE.

Those who have a fancy for fishing on a really large scale should go to Reikiavik in the spring and take part in the line fishing for large Greenland sharks. Even the bait it original, consisting as often as not of the head of a small seal; otherwise, immense strips of seal flesh are used. The line is every now and then given a jerk by the way of stimulating the shark's appetite and it is finally hauled to the surface, its desperate revolutions being neutralized by a stout swivel, the liver cut out, and the huge carcass as a rule cut adrift, though at times the flesh is eaten after being hung for some time.

French has been made the official language of the Quebec legislature. All the records will be kept in French, but English speaking members will be permitted to speak their own tongue.

King Edward has endeavored to revive the ancient custom of taking snuff. A snuff-box is handed to him each day at dinner just before the desert.

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Attractions for Next Week.

Communion rules as it always has and always will. No person, family, institution, city or nation ever amounted to anything when it worked for its own interest alone. It is what men, cities and nations do for the advancement of the world in general that counts. China shut herself out from the world that she might retain all the good things for herself. Rome spread civilization over the whole earth; but for Rome we might yet be barbarians. Now who will continue to go down in history as the greater—a Roman or a Chinaman? Popular Mechanics tries to aid the people everywhere in the general advancement of Mechanical arts. "The World is Its Field."

In Germany alcohol is supplanting coal, gas and oil for fuel and light. An alcohol locomotive there pulls a train of twelve cars. Popular Mechanics will tell about it next week.

In France rats are of nearly as great commercial value as are hogs in America. Rats of Paris are raised to clean bones, their furs are used for trimmings, their skins for gloves and in fact every part of the rat is turned into money. Read about it next week.

"Why can't you make paper like that?" said a man to a paper manufacturer a few years ago, as he held forth in his hand an old hornets' nest. Paper then was high, raw material was scarce and the demand was great. The man with the hornets' nest and the paper manufacturer sat themselves down to study. "If a hornet can make paper from wood," said they, "why can't a man make paper from wood?" And that is just what they did and today we have the great wood pulp paper industry, one of the most important in the country. We will tell about it next week. We will also tell about how unscrupulous manufacturers force us to eat jelly made from old boot legs; how the nature of our immigration has changed so that Italians, Slovak and Hebrews instead of Irish and Germans are now filling our country; about how the great natural gas supply of Indiana is becoming exhausted and factories are forced to close, and about three or four dozen other things just as interesting and instructive. Popular Mechanics interests nearly everybody.

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